



# North Carolina Clean Water State Revolving Fund

## Enabling CHP at Wastewater Treatment Plants

### Program Description

The North Carolina Department of Environmental Quality (NC DEQ) offers low-interest loans and other financial tools to help fund clean water projects through its Clean Water State Revolving Fund (CWSRF). The CWSRF program was created as the result of a 1987 amendment to the Federal Clean Water Act. The program, administered by the U.S. Environmental Protection Agency, provides federal funds on an 80:20 basis (80% federal, 20% state) to assist with financing high-priority wastewater projects. Under federal program guidelines, projects eligible for funding include those that reduce energy consumption, making combined heat and power (CHP) an ideal candidate.

Two municipal wastewater treatment plants (WWTPs) in North Carolina have utilized the CWSRF to finance CHP at their facilities:

- McAlpine WWTP, operated by Charlotte Water in Pineville, installed a 1 MW biogas-fueled CHP system in 2017.
- Muddy Creek WWTP, operated by the Water and Sewer Authority of Cabarrus County in Winston-Salem, installed a 1.1 MW biogas-fueled CHP system in 2017.

The McAlpine Creek WWTP was the first WWTP in North Carolina to utilize anaerobic digester gas to power a CHP system. Charlotte Water was awarded a \$3.2 million, 20-year, 0% interest loan under the CWSRF's Green Project Reserve to fund the construction the McAlpine CHP plant (the engine was purchased separately). This loan covered 70% of the \$4.6 million total costs, with a payback of less than 13 years. The Muddy Creek project was funded with a \$6 million CWSRF loan that covered the full costs of construction, equipment, and engineering for the project, with a 15-year payback.

### Program Background and Development

The CWSRF program replaced its predecessor (the Construction Grant Program) in 1987 and was updated most recently in 2014 under the Water Resources Reform and Development Act. The program offers a variety of financial services to enable clean water projects, including loans at below market interest rates (as low as 0%), project refinancing, debt



**Biogas CHP at McAlpine WWTP in Pineville**

PHOTO: DOE SOUTHEAST CHP TAP

guarantees, and debt forgiveness. These financial tools are funded circularly (as denoted by the program's name); payments received are re-directed back into the program, helping to keep it well-funded. Loan terms are for up to 30 years or the useful life of the project, whichever comes first.

Federal rules identify 11 eligible project categories, including construction of publicly owned treatment works, national estuary program projects, decentralized wastewater treatment systems, water conservation, efficiency, and reuse. Energy efficiency is the most relevant to CHP. The American Recovery Act of 2009 (ARRA) introduced a requirement that no less than 10% of state funds be allocated for a Green Project Reserve initiative that would target water efficiency improvements, energy efficiency improvements, green infrastructure, and environmentally innovative activities. This requirement has been carried forward and is useful in prioritizing projects including CHP, which fall under the branch of energy efficiency.

The program, which operates in all 50 states and Puerto Rico, is housed under a variety of state offices, including environmental quality or conservation departments, infrastructure authorities, finance authorities, energy offices, and water resource boards. Each state operates its own CWSRF program with its own priorities that fall within the federal guidelines. Some states, such as California, focus on supporting greenhouse gas reduction targets. North Carolina's program, which has been active since 2004 and is housed in the NC DEQ, is focused on rehabilitating and replacing aging infrastructure, failing systems, and facility expansion. In North Carolina, the program is available only to local government entities.

Under the CWSRF regulations, each state must develop an intended use plan (IUP) that identifies how funds are to be utilized, as well as the method and criteria for selecting projects to receive funds. Most states have a scoring system with project ranking criteria that include areas such as stormwater mitigation, watershed protection, water efficiency, drought tolerance, resilience, and green infrastructure improvements. To rank higher among projects seeking funding, CHP projects in North Carolina and other states benefit if they address multiple ranking criteria within the state's priorities, in addition to green infrastructure.

## In Support of Sustainability

Local governments are signing on to sustainability goals, such as those established in the Bloomberg American Cities Climate Challenge and the Sierra Club's Ready for 100 campaign, to lower carbon emissions and utilize renewable energy resources. For instance, the City of Charlotte committed to reducing carbon intensity below 2 tons per person by 2050. By incorporating CHP at WWTPs, these municipalities can work toward their goals by increasing efficiency and using waste products to create electricity rather than flaring the methane produced onsite. For example, a 5 MW CHP system with a heat recovery boiler would reduce annual CO<sub>2</sub> emissions by nearly half (23 ktons) of those produced by the equivalent conventional power plant and boiler (45 ktons).

## Program Results and Successes

Twelve CHP projects were funded via the CWSRF between 2006 and 2011, including three in Virginia and two in New York, with additional project installations since then. The Delhi Charter Township WWTP located in Ingham County, Michigan, received a \$9.85 million, 1.625% interest loan, enabling the town to upgrade its undersized and congested plant with new digesters and two 30 kW microturbines. DC Water's Blue Plains Advanced Wastewater Treatment Plant finished building a new CHP system after receiving a \$8.2 million loan from the Maryland CWSRF. This project helps the facility save \$10 million in electrical operation expenses annually.

### Resources:

- [EPA CWSRF website](#)
- [North Carolina CWSRF website](#)
- [Green Project Reserve Report](#)
- [CHP Opportunities at WWTPs](#)
- [Financing CHP Projects at Wastewater Treatment Facilities with Clean Water State Revolving Funds](#)

- As of end-2017, a total of 51 CWSRF programs (50 states and Puerto Rico) delivered over \$126 billion in funding to local water and wastewater efforts, as well as providing 39,948 low-interest loans (1.5% average interest rate in 2018).
- North Carolina has received ~\$24 million in federal funding over the last several years and cumulatively \$786 million since 1989.
- In its first year of implementation (2009–2010), the Green Project Reserve funded \$606 million in energy efficiency projects, including multiple CHP installations.
- The CWSRF has funded CHP installation at 184 WWTPs across the United States.

## For More Information

**U.S. DOE SOUTHEAST CHP  
TECHNICAL ASSISTANCE  
PARTNERSHIP (CHP TAP)**  
Isaac Panzarella, P.E.  
919-515-0354  
[ipanzarella@ncsu.edu](mailto:ipanzarella@ncsu.edu)

**NC DIVISION OF ENVIRONMENTAL  
QUALITY, DIVISION OF WATER  
INFRASTRUCTURE – WASTEWATER  
PROJECTS**  
Anita Robertson, P.E.  
[anita.robertson@ncdenr.gov](mailto:anita.robertson@ncdenr.gov)

**For more CHP resources:**  
[www.sechptap.org](http://www.sechptap.org)  
[www.energy.gov/chp](http://www.energy.gov/chp)

Date produced: June 2020